COLLEGE OF ENGINEERING

SEMINAR ANNOUNCMENT

"*Rapid Drawdown Stability Analysis using the Finite Element Method*"

Presenter by Dr. Daniel R. VandenBerge, P.E.

Abstract

Rapid drawdown occurs for an earth dam when the reservoir water level is dropped quickly, increasing the shear stress within the soil slope. This slope stability condition controls the design of the upstream slope of most earth dams. Complex and time-dependent pore pressures occur within the slope as a result of changing boundary conditions. This complexity necessitates the use of multistage calculation methods that predict soil strength based on conditions that existed prior to drawdown. The current state of practice is the three-stage method presented by Duncan et al. (1990), which uses stresses from limit equilibrium analysis to predict strength following drawdown. A new method based in finite element analysis has been recently developed, which uses finite element analysis to estimate the long-term effective stresses within an earthen embankment. The distribution of soil strength corresponding to the finite element stresses is calculated and used to evaluate stability following drawdown. Real-world and hypothetical examples are used to compare the results of the existing and new methods.

About the Speaker

Daniel VandenBerge received his bachelor's and master's degrees in civil engineering from Michigan Technological University in 2001 and 2003, respectively. He spent seven years working as a geotechnical engineer for EDP Consultants, Inc. in Cleveland, Ohio. During that time, VandenBerge obtained his professional engineer's license. From 2010 to 2014, he pursued a doctorate in civil engineering from Virginia Tech, focusing on the use of finite element analysis to model the rapid drawdown slope stability design conditions. After graduating in 2014, he managed the geotechnical laboratories at Virginia Tech and continued research in slope stability analysis and soil shear strength as postdoctoral associate. VandenBerge's specialties also include the behavior of compacted clays and probabilistic methods in geotechnical engineering.

Date: Wednesday, Oct. 21, 2015
Time: 12 P.M. – 1 P.M.
Location: Prescott 225